

- ☒ fossil energy
- ☐ environmental
- ☐ energy efficiency
- ☐ other

CO₂/SAND FRACTURING

States Impacted:

Colorado, Illinois, Indiana,
Kansas, Kentucky, Montana,
New Mexico, New York, Ohio,
Oklahoma, Pennsylvania,
Tennessee, Texas, Utah,
West Virginia, Wyoming

Benefit Areas:

Increased Gas Production,
Increased Revenues

Participants:

Petroleum Consulting
Services

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Description

CO₂/Sand Fracturing technology is a "dry" stimulation technique that is particularly useful for stimulating water-sensitive formations. The technology benefits independent producers. Many gas wells need to be stimulated by hydraulic fracturing to produce at commercial rates. During the standard fracturing process, pumped fluids actually limit the expected production gains because of solids plugging, water retention, and chemical interactions.

The CO₂/Sand Fracturing technology enables proppant to be placed into a created fracture using liquid CO₂ as the carrier fluid (without water or any additional treatment additives). The process has been successfully used in Canadian oil and gas fields since 1981, where over 1,200 liquid CO₂/Sand stimulations have been successfully performed. The key component of the process, the CO₂ blender, blends proppant into the liquid CO₂ stream, thereby eliminating the need for additional carrier fluids to transport sand. No damaging fluids are introduced into the pay zone, and as a result, the potential for damage to water-sensitive formations is virtually eliminated. Rigs do not need to be placed over the well hole either before or following treatment, and frac tanks are not needed.

Goals

The goal is to test and assist in commercializing a non-damaging stimulation technology called CO₂/Sand Fracturing process (also called "Dry Frac") for natural gas wells.

Tangible Benefits

National: This technology can help ensure the availability of domestic natural gas. The CO₂/Sand Fracturing Technology won industry's *Best Technology in Northeast* award. The stimulation method optimizes well productivity and increases the efficiency of capital expenditures. Although the technology shows an increase in initial costs (because of the cost of CO₂), an increase in net present value occurs in four to six months because of increased production. In a 5-month test, for example, two to five times more natural gas was produced in the Appalachian region with the CO₂/Sand Fracturing technology than with other methods. Wells stimulated with CO₂/Sand have produced four times as much gas as those stimulated with foam and twice as much as those completed with nitrogen. The method also results in shorter and cheaper cleanup times, because there is no water involved and water hauling and disposal costs are eliminated. Production enhancements, as well as the cost savings, have resulted in a net economic gain in many cases.

Regional: The CO₂/Sand Fracturing technology is particularly useful in three different settings: (1) low-permeability formations where stimulation fluids reduce gas permeability, (2) high-permeability reservoirs that have been damaged by drilling fluid invasion, and (3) low-pressure reservoirs that are intrinsically dry (have little or no mobile water content.) The method has been successfully tested in the Appalachian, San Juan, Permian, and Williston basins.